What is Claimed is:

1. A process for the manufacture of a $LiMPO_4$ powder, comprising the steps of:

providing an equimolar aqueous solution of Li^{1+}, M^{n+}, and PO_4^{3-} prepared by dissolving components which are susceptible to coexist as solutes in an aqueous system and which, upon heating at a temperature below 500° C, decompose to form a pure homogeneous Li and M phosphate precursor;

evaporating water from the solution, thereby producing a solid mixture;

decomposing the solid mixture at a temperature below 500° C to form a pure homogeneous Li and M phosphate precursor; and

annealing the precursor at a temperature of less than 800° C in an inert or reducing atmosphere, thereby forming a $LiMPO_4$ powder;

wherein M^{n+} is one or more of Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}, and Mn^{2+}, and M is $Fe_xCo_yNi_zMn_w$, with $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq w \leq 1$, and $x + y + z + w = 1$.

2. The process according to claim 1, wherein in the step of annealing the precursor, the annealing temperature is less than 600° C.

3. A process for the manufacture of a $LiFePO_4$ powder, comprising the steps of:

providing an equimolar aqueous solution of Li^{1+}, Fe^{3+}, and PO_4^{3-} prepared by dissolving components which are susceptible to coexist as solutes in an aqueous system and which, upon heating at a temperature below 500° C, decompose to form a pure homogeneous Li and Fe phosphate precursor;

evaporating water from the solution, thereby producing a solid mixture;

decomposing the solid mixture at a temperature below 500° C to form a pure homogeneous Li and Fe phosphate precursor; and

annealing the precursor at a temperature of less than 800° C in a reducing atmosphere, thereby forming a $LiFePO_4$ powder.

4. The process according to claim 3, wherein in the step of annealing the precursor, the annealing temperature is less than 600° C.

5. The process according to claims 3, wherein the Fe^{3+} bearing component is iron nitrate.

6. A powder for use in lithium insertion-type electrodes with a formula $LiMPO_4$ having an average particle size of less than 1 μm, wherein M is $Fe_xCo_yNi_zMn_w$, with $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq w \leq 1$, $x + z + w > 0$, and $x + y + z + w = 1$.

7. The powder according to claim 6, wherein M is Fe, the powder having a reversible electrode capacity of at least 65% of a theoretical capacity when used as an active component in a cathode that is cycled between 2.70 and 4.15 V vs. Li^+/Li at a discharge rate of C/5 at 25° C.

8. A powder for use in lithium insertion-type electrodes prepared by a process comprising the steps of:

providing an equimolar aqueous solution of Li^{1+}, M^{n+}, and PO_4^{3-} prepared by dissolving components which are susceptible to coexist as solutes in an aqueous system and which, upon heating at a temperature below 500° C, decompose to form a pure homogeneous Li and M phosphate precursor;

evaporating water from the solution, thereby producing a solid mixture;

decomposing the solid mixture at a temperature below 500° C to form a pure homogeneous Li and M phosphate precursor; and

annealing the precursor at a temperature of less than 600° C in an inert or reducing atmosphere, thereby forming a $LiMPO_4$ powder;

wherein M^{n+} is one or more of Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}, and Mn^{2+}, and M is $Fe_xCo_yNi_zMn_w$, with $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq w \leq 1$, and $x + y + z + w = 1$.

9. The powder according to claim 8, wherein M^{n+} is Fe^{3+}, M is Fe. and the annealing occurs in a reducing atmosphere.

10. A battery comprising a lithium insertion-type electrode including a powder prepared by a process comprising the steps of:

providing an equimolar aqueous solution of Li^{1+}, M^{n+}, and PO_4^{3-} prepared by dissolving components which are susceptible to coexist as solutes in an aqueous system and which, upon heating at a temperature below 500° C, decompose to form a pure homogeneous Li and M phosphate precursor;

evaporating water from the solution, thereby producing a solid mixture;

decomposing the solid mixture at a temperature below 500° C to form a pure homogeneous Li and M phosphate precursor; and

annealing the precursor at a temperature of less than 600° C in an inert or reducing atmosphere, thereby forming a $LiMPO_4$ powder;

wherein M^{n+} is one or more of Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}, and Mn^{2+}, and M is $Fe_xCo_yNi_zMn_w$, with $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq w \leq 1$, and $x + y + z + w = 1$.

11. The battery according to claim 10, wherein the powder has an average particle size of less than 1μm and $x + z + w > 0$.

12. The battery according to claim 11, wherein M is Fe, the powder having a reversible electrode capacity of at least 65% of a theoretical capacity when used as an active component in a cathode that is cycled between 2.70 and 4.15 V vs. Li^+/Li at a discharge rate of C/5 at 25° C.

13. The battery according to claim 10, wherein M^{n+} is Fe^{3+}, M is Fe, and the annealing occurs in a reducing atmosphere.

14. A process for the manufacture of a lithium insertion-type electrode comprising the steps of:

providing an equimolar aqueous solution of Li^{1+}, M^{n+}, and PO_4^{3-} prepared by dissolving components which are susceptible to coexist as solutes in an aqueous system and which, upon heating at a temperature below 500° C, decompose to form a pure homogeneous Li and M phosphate precursor;

evaporating water from the solution, thereby producing a solid mixture;

decomposing the solid mixture at a temperature below 500° C to form a pure homogeneous Li and M phosphate precursor;

annealing the precursor at a temperature of less than 600° C in an inert or reducing atmosphere, thereby forming a $LiMPO_4$ powder;

providing a mixture of the $LiMPO_4$ powder and a conductive carbon bearing powder; and

milling the mixture during a period of time to optimize a reversible electrode capacity of the electrode;

wherein M^{n+} is one or more of Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}, and Mn^{2+}, and M is $Fe_xCo_yNi_zMn_w$, with $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq w \leq 1$, and $x + y + z + w = 1$.

15. The process according to claim 14, wherein M is Fe, the conductive carbon powder is one of Acetylene Black and Carbon Super P, the weight ratio of $LiFePO_4$/carbon is between 75/25 and 85/15, and the milling time is between 15 and 25 minutes.

16. The process according to claim 14, wherein the powder has an average particle size of less than 1μm and $x + z + w > 0$.

17. The process according to claim 16, wherein M is Fe and the reversible electrode capacity is at least 65% of a theoretical capacity when used as an active component in a cathode that is cycled between 2.70 and 4.15 V vs. Li^+/Li at a discharge rate of C/5 at 25° C.